UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

OCT 26 2012

REPLY TO THE ATTENTION OF:

S-6J

MEMORANDUM

SUBJECT: Risk-Based Disposal of PCB-Contaminated Material at Allied Paper Landfill, Operable Unit 1 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site

FROM: Richard C. Karl, Director Sam Borries for
Superfund Division

TO: Margaret Guerriero, Director
Land and Chemicals Division

The purpose of this memorandum is to request your consultation on the proposed risk-based cleanup and disposal of polychlorinated biphenyl (PCB)-contaminated material at Allied Paper Landfill (Allied Landfill), Operable Unit 1 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site located in Kalamazoo, Michigan. Pursuant to Region 5 Delegation 12-5, I am requesting that you provide my office with any comments, questions or concerns you may have regarding disposal of PCB material at Allied Landfill.

For this site, the requisite elements on which the U.S. Environmental Protection Agency can base its decision that on-site disposal of PCB material "will not pose an unreasonable risk of injury to health or the environment" (40 C.F.R. § 761.61(c)(2)), are found in the Remedial Investigation and Feasibility Study Reports and are summarized in the attached technical memorandum.

The proposed remedial alternative calls for excavation of PCB-contaminated material to site-specific cleanup levels followed by on-site consolidation and capping of PCB contaminated material. Groundwater monitoring would be conducted for evaluation of remedy performance. As explained in the attached memorandum, EPA expects the proposed landfill cap to be comparable in protectiveness to the Michigan Part 111 Hazardous Waste Cap, the type of cap required on Toxic Substances Control Act waste landfills in the State of Michigan.

In keeping with Region 5's policy of informing the public of 40 C.F.R. § 761 approvals, the Region 5 Superfund Division proposes to place this memorandum and your response to this memorandum in the administrative record for Allied Landfill. Both documents will be made available for public comment and review along with the proposed plan for Allied Landfill.

If you have any questions, comments or concerns regarding this matter, please contact Michael Berkoff of my staff at (312) 353-8983 or berkoff.michael@epa.gov.

Attachment

Risk-Based Disposal of PCB Remediation Waste Allied Paper/Kalamazoo River—Operable Unit 1 Allied Paper/Portage Creek/Kalamazoo River Site, Kalamazoo, Michigan

This document presents remedial alternative design concepts and general evaluation of risks associated with the disposal of polychlorinated biphenyls (PCBs) at Allied Landfill, Operable Unit 1 (OU1) of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site.

The Toxic Substances Control Act (TSCA) governs the disposal of specific chemicals, including PCBs. TSCA regulations, set forth at 40 CFR 761.61(c), provide a process that can be used in Superfund cleanups to allow the use of site-specific cleanup numbers and on-site disposal of PCB remediation wastes. This process is commonly referred to as risk-based disposal. EPA Region 5's regional TSCA delegation provides the Director of the Superfund Division with the authority, subject to consultation with the Director of the Land and Chemicals Division, to approve or deny applications for risk-based disposal of PCBs.

The elements of a risk-based disposal application are typically found within the Remedial Investigation (RI) and Feasibility Study (FS) Reports, the proposed plan, or a stand-alone risk-based disposal memo. The requisite elements on which EPA can base its decision that on-site disposal of PCB material "will not pose an unreasonable risk of injury to health or the environment" (40 CFR 761.61(c)(2)) are found at 40 CFR 761.61(a)(3) and, briefly stated, include:

- the nature of the contamination, including kinds of materials contaminated;
- a summary, including sample collection and analysis dates, of the procedures used to sample contaminated and adjacent areas and a table or cleanup site map showing PCB concentrations measured in all pre-cleanup characterization samples;
- the location and extent of the identified contaminated area, including topographic maps with sample collection sites cross referenced to the sample identification numbers in the data summary described above (this information is included in the RI);
- a cleanup plan for the site, including schedule, disposal technology, and approach. The plan should include contingencies for unanticipated higher concentrations or wider distributions of PCB remediation waste (this information can be found in the FS and the Proposed Plan).

This technical memorandum summarizes the requisite information for EPA Region 5 to evaluate a risk-based disposal under 40 CFR 761.61(c).

Site Background and History

The Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (the Site) is located in Allegan and Kalamazoo counties in southwest Michigan. PCBs are the primary contaminant of concern (COC) at the Site. The Site includes 80 miles of the Kalamazoo River, adjacent floodplains and wetlands, paper-residual disposal areas, and former paper mill properties, all pervasively contaminated with PCBs as the result of the recycling of carbonless copy paper. The Allied Paper Landfill (OU1) is located within the City of Kalamazoo, Michigan, and is defined as the areas between Cork Street and Alcott Street where contamination from paper operations is located.

PCBs were present in the recycling process from at least 1957 until well after production of carbonless copy paper containing PCBs stopped in the 1970s. With disposal operations at OU1 ceasing in the late 1980s, any PCB contamination at OU1 has been there for at least 35 years. The PCB-containing materials, referred to in this technical memorandum as residuals, have been the focus of the investigations conducted at OU1.

OU1 was designated as a distinct operable unit within the Kalamazoo River Site, in part so cleanup activities could proceed on a separate schedule relative to the remedial activities developed for other distinct areas of the Site. Between 1998 and 2004, a series of actions were completed to minimize exposure potential by consolidating and capping a portion of the PCB-containing materials at OU1 in the Historic Residual Dewatering Lagoons (HRDLs) and Former Residual Dewatering Lagoons (FRDLs). Information on the actions performed is summarized in the RI Report (MDEQ 2008) and the FS Report (CH2M HILL 2012).

Nature of Contamination

The primary source of PCB contamination at OU1 is paper waste residuals from the recycling of carbonless copy paper that contained PCBs as a carrier for the ink. PCBs were present in the wastewater produced from the recycling process. PCB contamination at OU1 is found in soil, sediment and residual samples. To a much lesser degree, it is also found in groundwater at OU1. PCB contamination in soil and sediment samples is strongly associated with the presence of residuals as PCBs strongly adsorb to organic material. With one exception, PCB concentrations greater than 10 parts per million (ppm) were associated with samples containing visible amounts of residuals (see Table 1).

The degree of adsorption of PCBs in soils is a function of the soil organic content and the adsorption properties of the specific PCB compounds that are present. Adsorption properties are generally characterized by an organic carbon partitioning coefficient denoted by Koc. The Koc values for PCBs are relatively high (Chou and Griffin 1986), which means that PCBs readily adsorb to organic material in media such as residuals, sediments and soils. The octanol water partitioning coefficient, Kow, is a measure of a chemical's solubility in water. The coefficient is the ratio of the chemical's concentration in octanol to the chemical's concentration in water. PCBs tend to have high Kow indicating they are not very soluble in water. Taken together, the combination of low water solubility and high Koc values indicates that PCBs have a strong affinity for soils and suspended solids, especially those high in total organic carbon (Chou and Griffin 1986). The residuals present at OU1 are composed primarily of fibrous wood material and clay (MDEQ 2008, p 1-4). Because PCBs have a high affinity for the residuals due to the residuals' high organic content, they do not readily migrate to groundwater. This is supported by the scarcity of PCB detections in groundwater samples at OU1, particularly the absence of detections in wells outside of the waste mass (MDEQ 2008, Section 4.4.3).

The highest detected level (2,500 ppm) of PCBs is in the Western Disposal Area. Since this area is uncapped, and subject to infiltration, EPA would expect to detect PCBs in downgradient wells if the PCBs at OU1 were readily mobile to and within groundwater. The PCBs have been present in these locations for at least 35 years, more than sufficient time for them to migrate downgradient if they were mobile. However, PCBs are not detected in the wells downgradient of the Western Disposal Area, further supporting the Superfund Division's conclusion that PCBs at OU1 are tightly bound to the residuals, soils and sediments and do not readily migrate to groundwater[1].

Consolidation testing of residual samples indicates the material has a low hydraulic conductivity, denoted as K, minimizing the groundwater flow through the residuals. Consolidation tests were performed on ten samples of residuals collected at four locations in the Bryant HRDLs and FRDLs (MDEQ 2008, Table 3-3). The estimated K value for the residuals is 1.3×10^{-7} cm/s. The hydraulic conductivity of soft compressible materials such as residuals is affected by their degree of consolidation. As residuals consolidate, their K decreases (Moo-Young and Zimmie 1996). This is significant at OU1 because it suggests that at the HRDLs and FRDLs, where residuals are quite thick and high concentrations of PCBs are located, the K of the residuals would likely decrease with depth and over time as consolidation proceeds, meaning that the hydraulic conductivity would decrease. The placement of 146,000 cubic yards (cy) of soil and residuals excavated during the prior removal action in the Bryant HRDLs and FRDLs, combined with the additional burden of a landfill cap over the area, has increased the effective stress on the underlying residuals. This should cause the residuals to further dewater and consolidate over time, further reducing their K (MDEQ 2008).

[1] OU1 hydrology is described in detail in the RI and the Ground Water Evaluation and Workplan for Supplemental Investigation.

Site Characterization Methods and Procedures

The site characterization methods and procedures are summarized in the RI Report (MDEQ 2008, Appendix C).

Extent of Contamination

Figure 35a from the RI Report shows the aerial extent of PCB-containing surface soils and residuals. Figure 35b from the RI Report shows the aerial extent of PCB-containing soils and residuals (MDEQ 2008, Section 3).

Table 2 summarizes the soil and residual samples analyzed for PCBs during the RI and removal actions. These samples represent the soils that would be consolidated under the landfill cap proposed to be constructed in OU1 under Alternative 2B of the FS Report.

Table 2 – Soil and Residual Sample Summary	
Number of Samples	189
Maximum concentration (ppm)	2500
Average concentration (ppm)	84
Samples >500 ppm	4%
Samples >50 ppm	22%

Remedial Action Objectives (RAOs) and Preliminary Remediation Goals (PRGs)

EPA has determined that PCB contamination at OU1 poses a risk to human health and the environment as identified in the Allied Paper/Portage Creek/Kalamazoo River Site Human Health Risk Assessment (HHRA) and Baseline Ecological Risk Assessment (BERA) (CDM 2003b and 2003a, respectively). EPA evaluated the potential exposure scenarios at OU1 and developed a Preliminary Remediation Goal Memorandum (PRG memo) (CH2MHill 2009) prior to the start of the FS. The PRG memo summarized protective PCB concentrations for various exposure pathways for humans and environmental receptors.

In the FS, EPA developed remedial action objectives for OU1 to address the contaminant levels and exposure pathways found to present potentially unacceptable risks to human health and the environment. The RAOs for OU1 are to:

- Mitigate the potential for human and ecological exposure to materials at OU1 containing COC concentrations that exceed applicable risk-based cleanup criteria;
- Mitigate the potential for COC-containing materials to migrate, by erosion or surface water runoff, into Portage Creek or onto adjacent properties; and
- Prevent contaminated waste material at the OU1 landfill from impacting groundwater and surface water.

Achieving the RAOs will protect against the risks posed by direct contact and ingestion of uncovered contaminated material, the migration of contaminated material after chronic and acute erosion events, and the transport of contaminated material into groundwater. A remedy that achieves these RAOs will result in there being no unreasonable risk of injury to health or the environment from exposure to PCB contamination at OU1.

As a part of this risk-based disposal, Superfund proposes to use the risk-based cleanup numbers summarized in the PRG memo for the direct contact residential, recreational, industrial/commercial and ecological (aquatic and terrestrial) exposure scenarios at OU1 (CH2M Hill 2009 and CH2M Hill 2012). For each human exposure scenario, the proposed cleanup numbers represent a carcinogenic risk of $1x10^{-5}$. This is the same level of allowable risk used in EPA's 1990 *Guidance on Remedial Actions for Superfund Sites with PCB Contamination* (EPA/540/G-90/007) that yielded preliminary remediation goals of 1 ppm for high occupancy (residential) exposure scenarios and 10 to 25 ppm for low occupancy (industrial/remote) exposure scenarios. EPA's proposed cleanup levels for OU1 differ from these values due to the use of site-specific inputs and the development of more specific exposure scenarios (CDM 2003a and CDM 2003b). EPA's proposed cleanup numbers (i.e., PRGs) are shown in Table 3.

Disposal Technologies and Approaches for the Waste-in-Place Cleanup Alternatives

Risk-based disposal approval is sought for Alternative 2B of the FS Report as it provides for PCB waste to be left in place. Under Alternative 2B, the Outlying Areas and the Monarch HRDL would be consolidated on the Bryant HRDLs/FRDLs areas. Additionally, portions of the perimeter around the Former Type III Landfill and Western Disposal Area and the toes of the Bryant HRDLs and FRDLs would be pulled back and consolidated on the Bryant HRDLs/FRDLs Landfill. Portions of the existing sheetpile wall would be removed and the remaining portions cut to below ground surface. Figure 4-2b of the FS Report provides the approximate extent of the excavation and landfill cap. Currently, there is a groundwater recovery and treatment system in place to prevent groundwater mounding upgradient of the sheet pile wall. Once sections of the sheetpile were removed under Alternative 2B, this system would be unnecessary and would be removed. A pre-design investigation would be performed to further delineate the extent of the PCB impacts requiring cleanup.

EPA estimates that under Alternative 2B, 500,000 cy of material within the Former Type III Landfill, Western Disposal Area, and Monarch HRDL would be excavated and consolidated. This quantity would be refined during the remedial design after incorporating findings from the pre-design investigation.

Following the excavation, post-excavation confirmatory sampling and analysis would be performed to ensure that any remaining PCB contamination does not pose an unreasonable risk of injury to human health or the environment. Once cleanup goals have been achieved, the excavated areas would be backfilled with clean material, graded to mitigate ponding, and revegetated. The Panelyte Marsh and Former Monarch Raceway Channel would be backfilled to existing grades and restored to promote the re-establishment of native vegetation.

The excavated materials would be consolidated on the Bryant HRDLs/FRDLs Landfill above the water table. The excavation volume would be refined during the pre-design investigation. After consolidation, each landfill area would be covered with an engineered cap. The proposed construction of the engineered cap is described in the following sections. A clean setback would be left between the landfill and Portage Creek to allow room for monitoring wells and, if needed in the future, a groundwater collection treatment system. Grades and height of the landfill cap would be determined during the remedial design to incorporate appropriate design criteria and factors of safety.

A groundwater monitoring system would be installed outside the waste, within the clean setback, to monitor the performance of the remedy.

Evaluation of PCB Remedial Alternatives

In consideration of leaving PCBs in place, alternatives were also evaluated that would meet the prescriptive cleanup standards within 40 CFR 761.61(a) *Self-implementing on-site cleanup and disposal of PCB remediation waste*. Generally, under 40 CFR 761.61(a) and (c), PCB remediation wastes <50 ppm may be disposed of at a solid or hazardous waste landfill or approved PCB disposal facility. Under 761.61(a), PCB remediation wastes with concentrations ≥50 ppm are to be disposed in a hazardous waste landfill or approved PCB disposal facility. Further, under 40 CFR 761.61(a), bulk PCB remediation wastes may remain at a cleanup site at concentrations >25 ppm and ≤100 ppm if the site is covered with a cap meeting the requirements of 761.61(a)(7) and (a)(8).

The FS Report presents multiple alternatives for the disposal of PCB remediation waste. Alternative 3 provides for the offsite disposal of soil exceeding PRGs. Alternative 4 is the construction of an onsite disposal facility with the same components as a State of Michigan RCRA hazardous waste landfill (Part 111). While both Alternatives 3 and

4 are technically feasible, they are far less implementable than Alternative 2B. Both Alternatives 3 and 4 result in an excavation volume of 1,600,000 cy of material instead of the 500,000 cy that would be excavated under Alternative 2B.

Design Details of the Engineered Cap

The cover system in Alternative 2B would achieve the RAOs described above by consolidating and covering the waste with a landfill cap that would prevent direct contact exposure and the erosion and off-site migration (both chronic and acute) of contaminated waste at levels that pose a risk of injury to human health and the environment. Installation of the cover system would also minimize infiltration, further reducing the risk that PCBs might migrate off-site via groundwater.

The cap evaluated in the FS Report consists of six layers, although this would be determined and specified in the remedial design. The anticipated layers are (from bottom to top): a non-woven geotextile, a 12-inch-thick (minimum) sand gas venting layer, a 30-millimeter polyvinyl chloride (PVC) flexible membrane liner (FML) or equivalent, a geosynthetic drainage composite layer, a 24-inch-thick (minimum) drainage and soil protection layer, and a 6-inch-thick (minimum) vegetated, topsoil layer.

A hazardous waste cap (Michigan Part 111) would contain an additional 2-foot clay layer to further reduce infiltration, but would not contain some of the other layers described above. The additional clay layer was not included in capping Alternative 2B because, given the nature of the PCB contamination at OU1, the addition of this layer would not significantly increase the protectiveness of the landfill cap. The residuals have a very low hydraulic conductivity (10^{-7} cm/sec), and PCBs have a high affinity for the residuals and high Kow indicating they are not very soluble in water. PCBs were only detected in groundwater exceeding criteria at well locations screened within or immediately adjacent to residuals with the highest concentrations of PCBs. A cap design, similar to that evaluated for Alternative 2B, was effectively installed at the King Highway Landfill and is being installed at the 12th Street and Willow Boulevard Landfills, three other operable units of the Site. Based upon the information provided above, the Superfund Division believes that the cap evaluated for Alternative 2B would be comparably protective as a hazardous waste cap, would result in a lower profile for the covered area, and would cost less than a hazardous waste cap. The components of the cap proposed under Alternative 2B are compared to a Michigan Part 111 hazardous waste cap in Figure 1.

Institutional controls (for example, deed restrictions to prevent exposure of PCBs at depth, and informational devices) and access restrictions (perimeter fence with posted warning signs) would be implemented as part of the remedial action. The institutional controls would be implemented at the onsite consolidated landfill areas and at any Outlying Areas where contaminated materials could not be completely excavated to prevent actions that might result in direct contact with the contaminated materials that remain.

Long-term inspections and maintenance would be performed for the newly-installed engineered landfill caps and the remaining sheet pile. A long-term monitoring program would be implemented to verify that groundwater quality conforms to applicable risk-based standards and to provide for the appropriate management of landfill gas. It is assumed that 20 monitoring wells would be installed at OU1 under Alternative 2B. The assumed groundwater monitoring network consists of existing and new monitoring wells (as needed) located outside areas where waste remains in place (Bryant HRDLs/FRDLs and or/Monarch HRDL Areas). The monitoring wells would be sampled in accordance with NREPA Part 201 and 40 CFR Section 761.75(b)(6). Analytical results from groundwater samples collected from monitoring wells adjacent to Portage Creek would be compared to the groundwater-surface water interface (GSI) criterion. Analytical results for samples taken in non-GSI areas would be compared to other appropriate criteria (for example, Groundwater Protection Screening Criteria). The Operation & Maintenance Plan, to be developed during the remedial design, would identify the long-term inspections, maintenance, and monitoring to be performed.

Quality Assurance and Quality Control

Post-excavation confirmatory sampling and analysis would be performed during the remedial action. The sampling protocol, in addition to quality assurance and quality control requirements, would be established during the remedial design. A long-term groundwater and gas monitoring program would also be implemented following the remedial construction. After each sampling event, the analytical results would undergo data validation, and the validated analytical results would be compared to Michigan Act 451 Part 201 Generic Screening Criteria.

Conclusions

PCB contamination at OU1 poses a risk of injury to human health and the environment through direct contact, off-site migration via erosion or surface water runoff, or transmission to groundwater.

Superfund's proposal to implement Alternative 2B from the FS would achieve the RAOs for OU1 (see above) and would result in there being no unreasonable risk of injury to human health or the environment posed by the PCB-contaminated material at OU1. The site-specific cleanup numbers for OU1 represent a carcinogenic risk of $1x10^{-5}$, consistent with the allowable risk level used in EPA's previously-mentioned PCB guidance. Material remaining in place uncapped would be at levels at or below the site-specific cleanup numbers for the given exposure scenarios. Contaminated materials remaining on-site that exceed the site-specific cleanup numbers would be consolidated beneath the above-described landfill cap, effectively preventing the potential for direct contact exposure. The above-described landfill cap would also mitigate the potential for off-site migration of the PCB-contaminated material through erosion and surface water runoff. The two-foot soil cover would both provide a sufficient barrier to prevent direct contact exposure and a sufficient buffer to protect the FML from damage. The geosynthetic drainage layer would prevent ponding, another threat to the FML. The FML would provide sufficient protection from infiltration given the site conditions and waste characteristics described earlier. Additionally, the low hydraulic conductivity of the residuals means that groundwater takes a preferential pathway *around* those materials, including the residuals contaminated with the highest levels of PCBs. The cover system in Alternative 2B would also prevent PCB-contaminated material from impacting groundwater and surface water. Currently at OU1, consolidation of materials and capping in the HRDLs and FRDLs has already demonstrated that limited PCB migration occurs, and implementation of Alternative 2B would further mitigate the hazards posed by the contamination at OU1.

In summary, the combination of the proposed cap layers and the nature of the paper residuals at OU1 make for a landfill cover system that Superfund believes would be equally as protective as a Michigan Part 111 cap, given the site conditions. For the reasons discussed above, the Superfund Division believes that implementation of Alternative 2B, which includes the risk-based disposal of PCBs, would result in no unreasonable risk of injury to human health or the environment.

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Table 1

Summary of Samples at OU1 With PCB Contamination ≥ 10 ppm

Matrix per Boring Logs	ParamID	StudyAreaGrp	StationID	Depth (ft)	Result (ppm)
Residuals	Total PCB	Former Operational Areas	FLF-2	20-22	2000
Residuals	Total PCB	Former Operational Areas	MW-120B	6-8	630
Residuals	Total PCB	Former Operational Areas	MW-120B	14-16	2500
Residuals	Total PCB	Former Operational Areas	MW-121B	10-12	650
Residuals	Total PCB	Former Operational Areas	WA-2	6-8	600
Residuals	Total PCB	Former Operational Areas	WA-6	10-12	800
Residuals	Total PCB	Former Operational Areas	WA-6	4-6	1100
Residuals	Total PCB	Former Operational Areas	WA-8	2-4	1100
Residuals	Total PCB	Former Operational Areas	BHDL-123	8-9.5	174
Residuals	Total PCB	Former Operational Areas	BHDL-123	6-8	195
Residuals	Total PCB	Former Operational Areas	BHDL-22	8-10	93
Residuals	Total PCB	Former Operational Areas	BHDL-22	6-8	430
Residuals	Total PCB	Former Operational Areas	DLHB-6	6-8	120
Residuals	Total PCB	Former Operational Areas	FLF-1	6-6.5	75
Soil[1]	Total PCB	Former Operational Areas	FLF-1	0-0.5	85
Residuals	Total PCB	Former Operational Areas	FLF-1	4-6	240
Residuals	Total PCB	Former Operational Areas	FLF-1	2-4	260
Residuals	Total PCB	Former Operational Areas	MLSS-1	8-10	59
Residuals	Total PCB	Former Operational Areas	MLSS-1	8-10	95
Residuals	Total PCB	Former Operational Areas	MLSS-1	10-12	97
Residuals	Total PCB	Former Operational Areas	MLSS-2	18-20	61
Residuals	Total PCB	Former Operational Areas	MLSS-2	16-18	89
Residuals	Total PCB	Former Operational Areas	MLSS-2	0-0.5	110
Residuals	Total PCB	Former Operational Areas	MLSS-3	12-14	120
Residuals	Total PCB	Former Operational Areas	MW-120B	10-12	69
Residuals	Total PCB	Former Operational Areas	MW-120B	18-19	130
Residuals	Total PCB	Former Operational Areas	MW-120B	6-8	180
Residuals	Total PCB	Former Operational Areas	MW-120B	16-18	330
Residuals	Total PCB	Former Operational Areas	MW-121B	14-16	51
Residuals	Total PCB	Former Operational Areas	MW-121B	12 -14	96
Residuals	Total PCB	Former Operational Areas	MW-125B	14-16	140
Residuals	Total PCB	Former Operational Areas	MW-126B	10-12	85
Residuals	Total PCB	Former Operational Areas	MW-12R	8-10	100
Residuals	Total PCB	Former Operational Areas	MW-8A	8-10	220
Residuals	Total PCB	Former Operational Areas	MW-8A	12-12.5	220
Residuals	Total PCB	Former Operational Areas	MW-8A	10-12	330
Residuals	Total PCB	Former Operational Areas	MW-8A	4-6	370
Residuals	Total PCB	Former Operational Areas	WA-6	12-13	300
Residuals	Total PCB	Former Operational Areas	WA-6	8-10	480
Residuals	Total PCB	Former Operational Areas	WA-8	8-10	51
Residuals	Total PCB	Former Operational Areas	WA-8	10-12	120
Residuals	Total PCB	Former Operational Areas	WA-8	6-8	260
Residuals	Total PCB	Former Operational Areas	BHDL-22	10-12	17

Table 1

Summary of Samples at OU1 With PCB Contamination ≥ 10 ppm

Matrix per Boring Logs	ParamID	StudyAreaGrp	StationID	Depth (ft)	Result (ppm)
Residuals	Total PCB	Former Operational Areas	DLHB-6	10-12	10
Residuals	Total PCB	Former Operational Areas	DLHB-6	6-8	14
Residuals	Total PCB	Former Operational Areas	DLHB-6	8-10	19
Residuals	Total PCB	Former Operational Areas	MLSS-1	12-14	23
Residuals	Total PCB	Former Operational Areas	MLSS-2	20-22	10
Residuals	Total PCB	Former Operational Areas	MLSS-2	14-16	18
Residuals	Total PCB	Former Operational Areas	MLSS-3	18-20	10
Residuals	Total PCB	Former Operational Areas	MLSS-3	16-18	13
Residuals	Total PCB	Former Operational Areas	MLSS-3	0-0.5	17
Residuals	Total PCB	Former Operational Areas	MLSS-3	14-16	28
Residuals	Total PCB	Former Operational Areas	MLSS-4	16-18	23
Residuals	Total PCB	Former Operational Areas	MLSS-4	14-16	35
Residuals	Total PCB	Former Operational Areas	MLSS-4	12-14	47
Residuals	Total PCB	Former Operational Areas	MLSS-5	20-22	10
Residuals	Total PCB	Former Operational Areas	MLSS-5	18-20	13
Residuals	Total PCB	Former Operational Areas	MW-121B	16-17.5	27
Residuals	Total PCB	Former Operational Areas	MW-125B	18-19	12
Residuals	Total PCB	Former Operational Areas	MW-125B	16-18	29
Residuals	Total PCB	Former Operational Areas	MW-126B	6-8	11
Residuals	Total PCB	Former Operational Areas	P-1	12-14	35
Possibly residuals (2)	Total PCB	Residential - Commercial	RD-1A		16.96
Residuals	Total PCB	Former Operational Areas	WA-1	10-12	22
Residuals	Total PCB	Former Operational Areas	WA-7	20-22	39

1) Residuals were not observed in the 0-0.5 foot depth sample of FLF-1 but were observed in the 2-4 foot sample.

2) The boring log indicated grey material in the soils but it was unclear if this was residual material

Table 3
Summary of Preliminary Remediation Goals for PCBs at OU1 – Allied Landfill

ALLIED LANDFILL Feasibility Study Report—Allied Paper, Inc. / Portage Creek / Kalamazoo River Superfund Site			
Medium	Pathway		PCB PRG
Soils	Human Health	Residential	2.5 mg/kg
		Non-Residential	16 mg/kg
		Recreational	23 mg/kg
	Ecological	Aquatic (Mink)	0.5–0.6 mg/kg
		Terrestrial (Robin)	6.5–8.1 mg/kg
Subsurface Soils	Human Health	Residential	2.5 mg/kg
		Non-Residential	16 mg/kg
		Recreational	23 mg/kg
	Ecological	Terrestrial (Robin)	6.5–8.1 mg/kg
Surface and Subsurface Sediments	Human Health	Fish Consumption	0.33 mg/kg[a]
	Ecological	Aquatic (Mink)	0.5–0.6 mg/kg
Groundwater (including seeps)	Human Health	Direct Contact	3.3 µg/L[b]
	Groundwater-Surface Water Interface (GSI)		0.2 µg/L[c]
Residuals	N/A		Qualitative: Where a removal is proposed, all visible residuals are to be removed unless analytical data are available to confirm PCBs (if present) are below applicable criteria.

Notes:

a Default sediment criteria of 0.33 mg/kg will be applied to shallow soil in areas of periodic inundation due to the potential runoff of shallow soils into surface water. Evaluation of contaminated soil runoff to surface water required under R299.5728(f).

b Groundwater for use as drinking water is not considered a complete pathway so the Part 201 Drinking Water criteria of 0.5 microgram per liter (µg/L) was not used. The Part 201 direct contact criteria were used for protection of human health due to the presence of seeps.

c The groundwater criteria protective of surface water is a PRG where the GSI is present.

mg/kg = milligrams per kilogram, which is equivalent to ppm
µg/L = micrograms per liter, N/A = not applicable

Source: CH2M HILL 2009

Figure 1. Comparison of Alternative 2B Proposed Cap to Michigan Part 111 Hazardous Waste Cap
(Not to Scale)